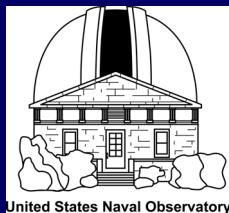


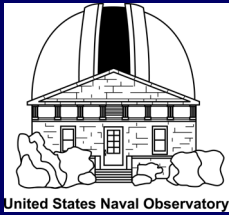
Astrometric Data Sources For Space Surveillance and Space Control

Sean E. Urban
U.S. Naval Observatory

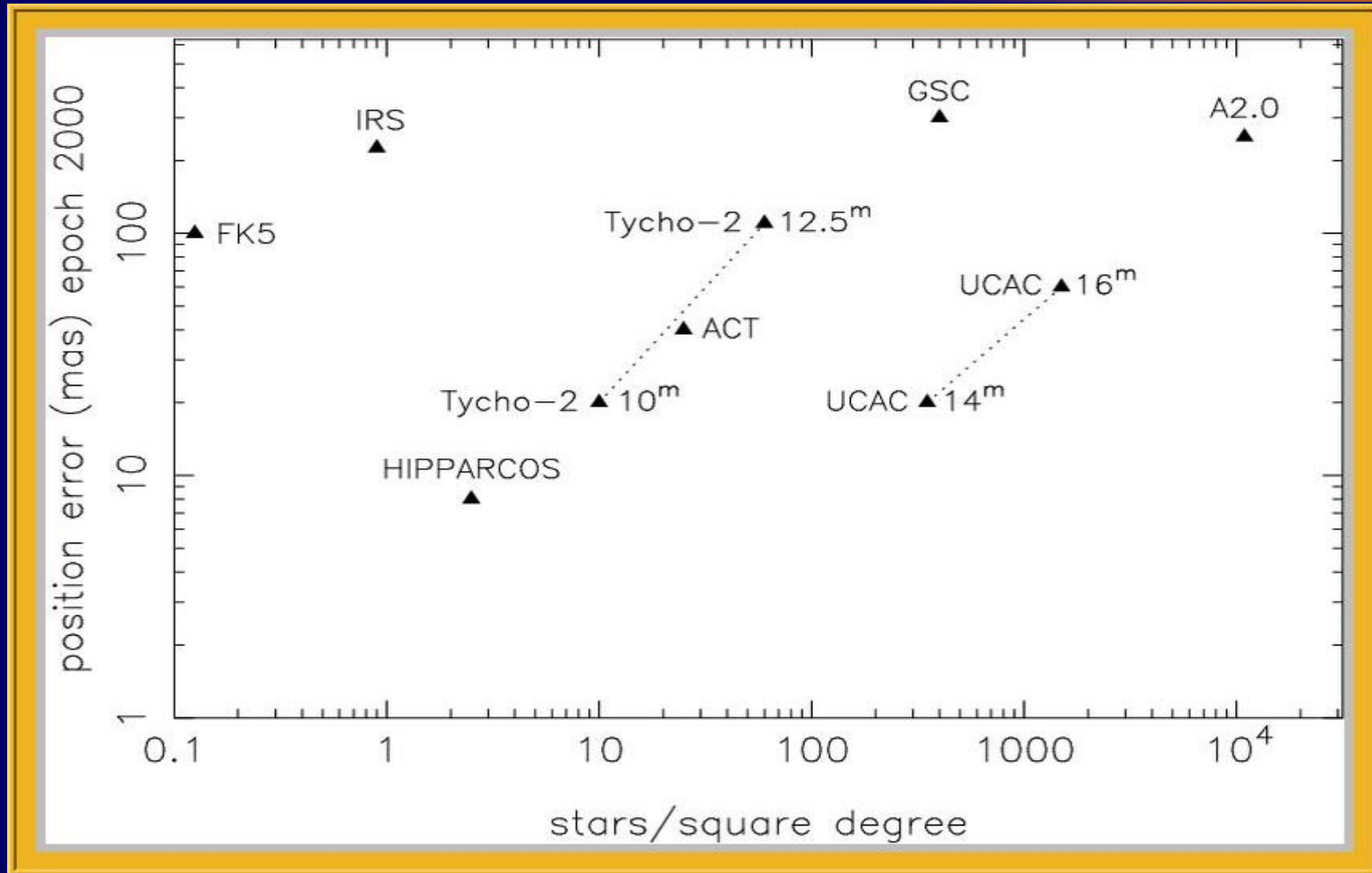


Error Budget

- How much devoted to *a priori* data?
- Systems moving toward higher accuracies
 - *a priori* data accuracies become important
 - Should utilize best data
 - Best changes: allow for updates
- Factors of 100 *for same star* not uncommon

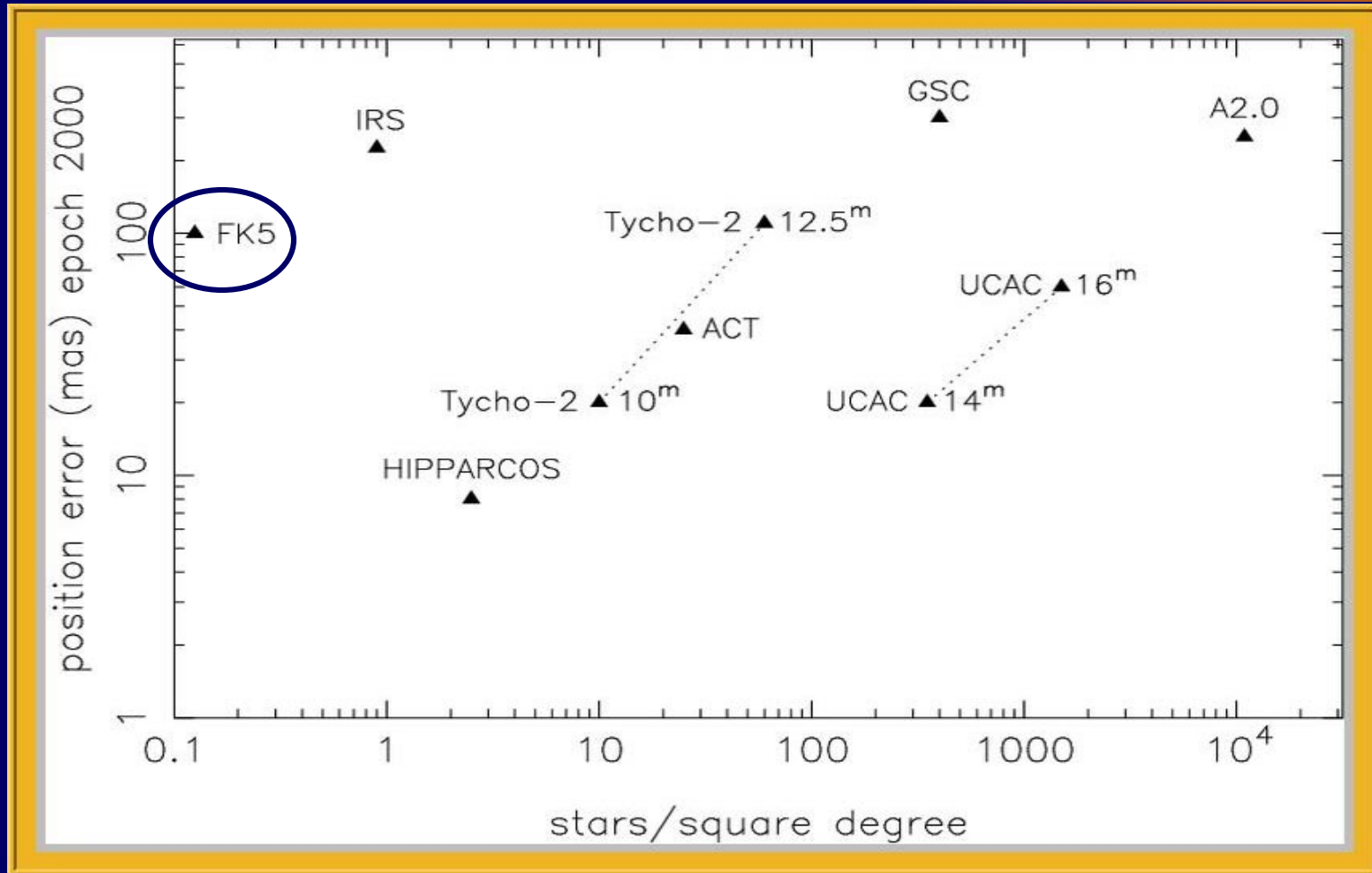


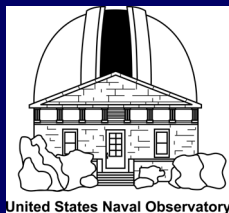
Major Astrometric Catalogs





Major Astrometric Catalogs





FK5 – Old Standard

- Number of stars: 4652
- Mag. Range: 0 to 9 (sparse beyond 6)
- Accuracies (2000)
 - Pos = 100 mas; P.M = 2 mas/yr
- Transit circle data – long epoch span
- Obsolete by Hipparcos



Obsolete FK5-based Catalogs

IRS – International Reference Stars

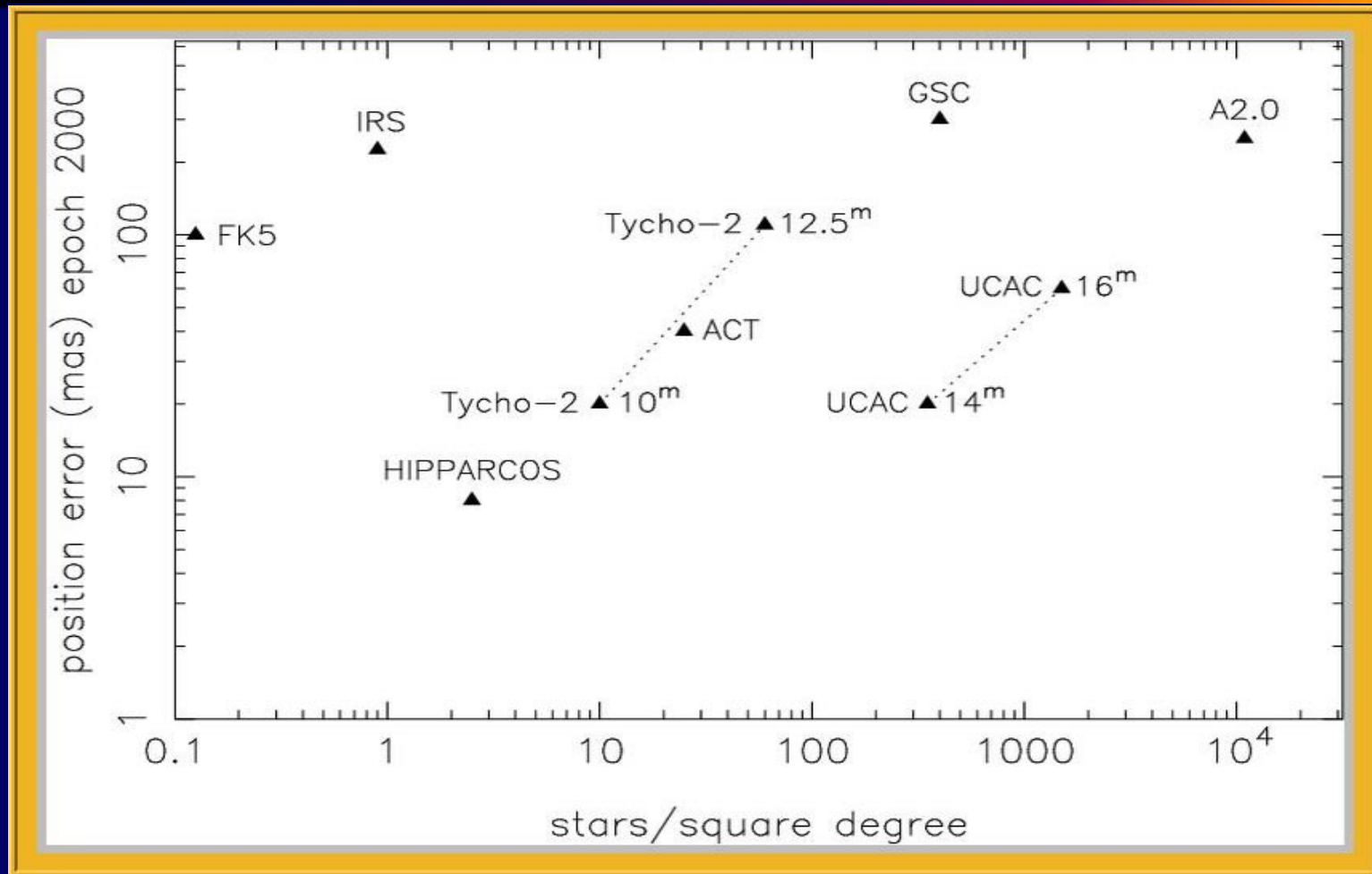
ACRS – Astrographic Cat. Reference Stars

PPM – Positions and Proper Motions

SAO – All incarnations

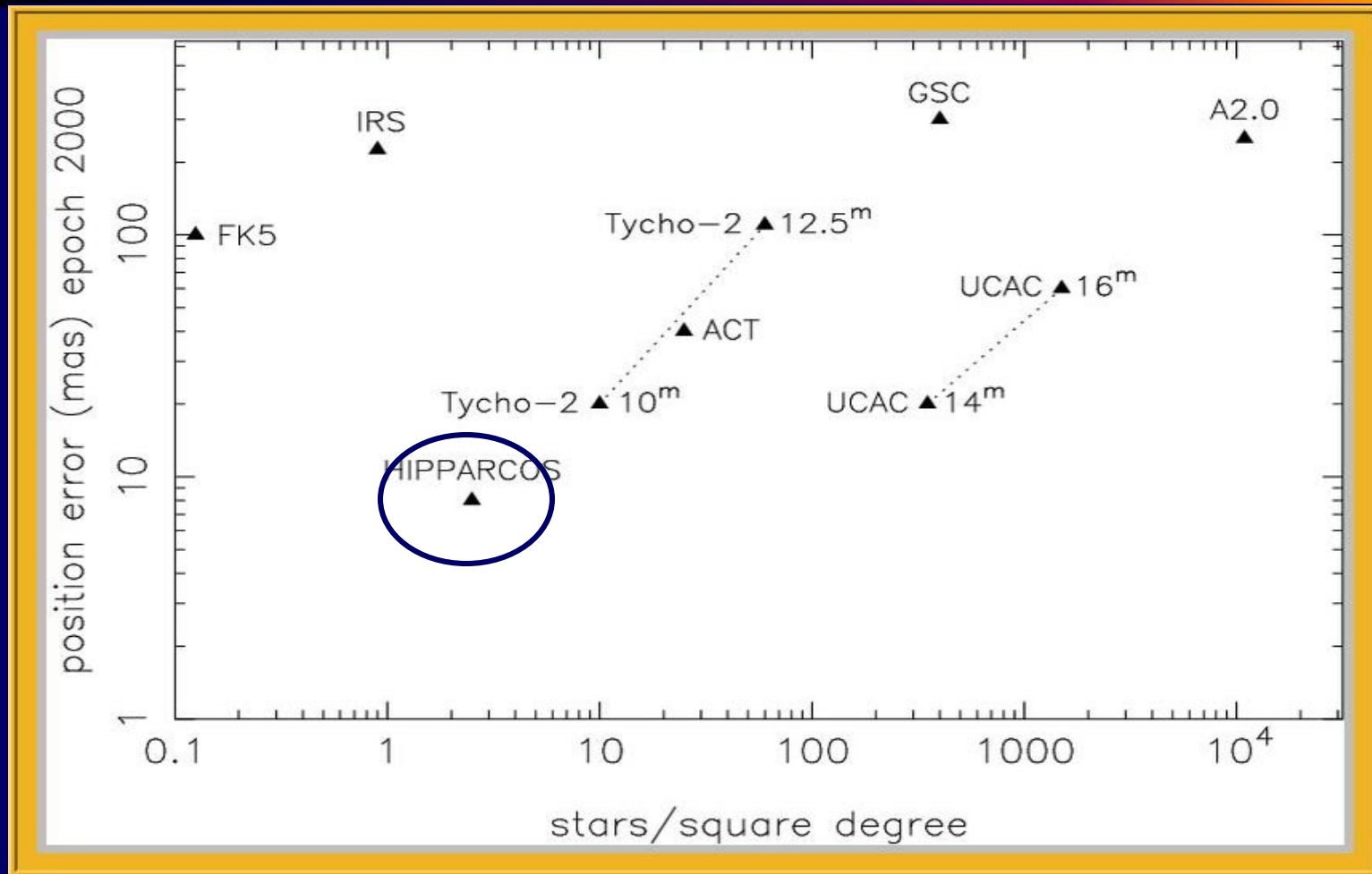


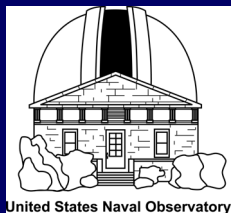
Major Astrometric Catalogs





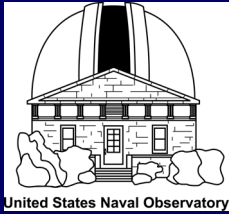
Major Astrometric Catalogs





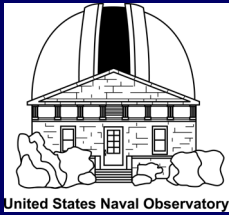
Hipparcos – New Standard

- Number of stars: 118,000
- Accuracies (2000)
 - Positions: 10 mas
 - Proper motions: 1-2 mas
- HIP satellite observations
- Not obsolete

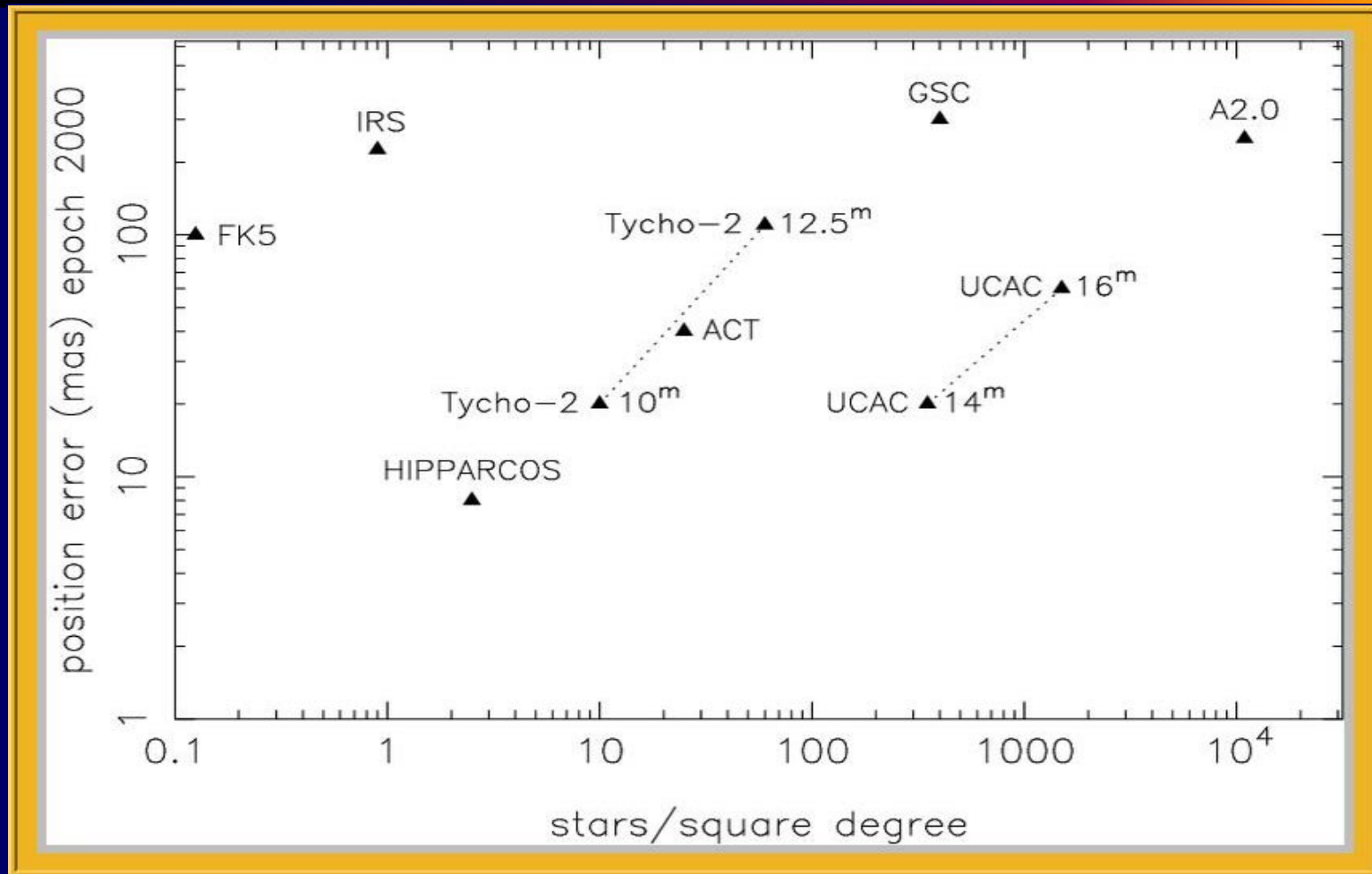


Hipparcos, continued

- Complete to $V=7.3$
- Stars as faint as 12th
- For high precision work, must be aware of flagged data

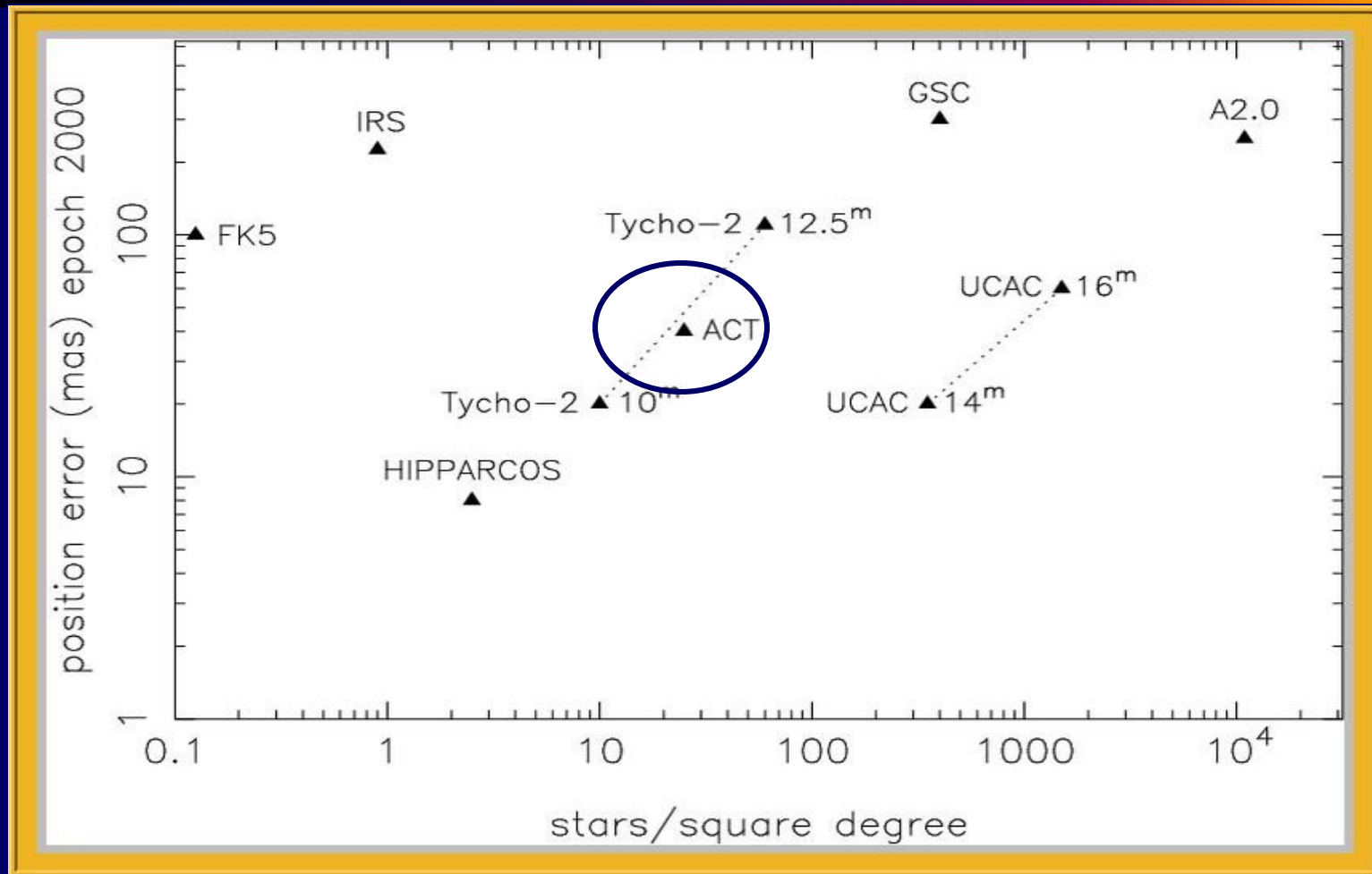


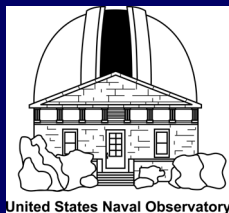
Major Astrometric Catalogs





Major Astrometric Catalogs



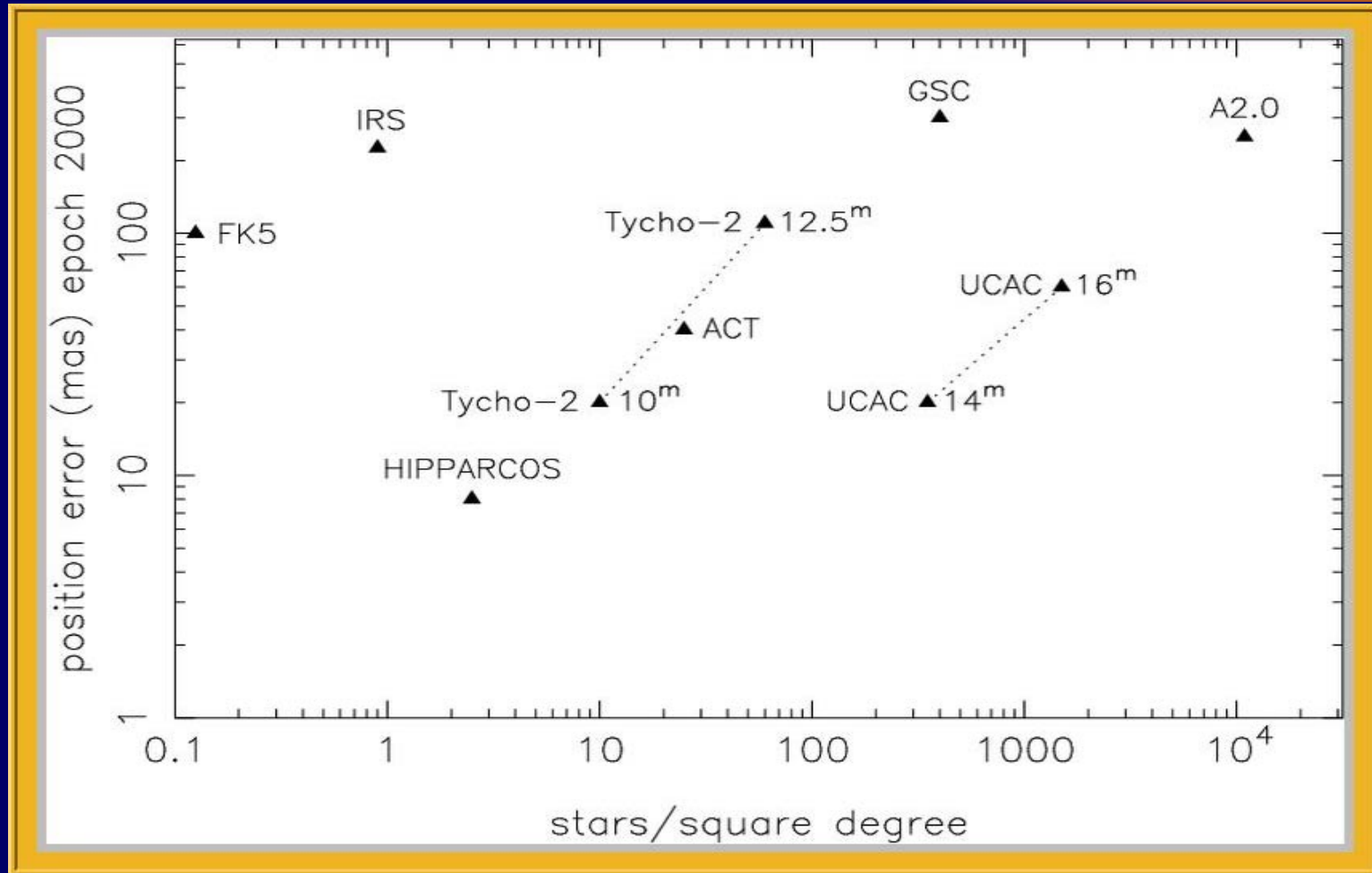


ACT Reference Catalog

- Number of stars: 998,758
- Mag. Range: 4th to 11th
- Accuracies (2000)
 - Pos = 40 mas; P.M. = 3 mas/yr
- Tycho (on HIP) and AC
- Obsolete by Tycho-2

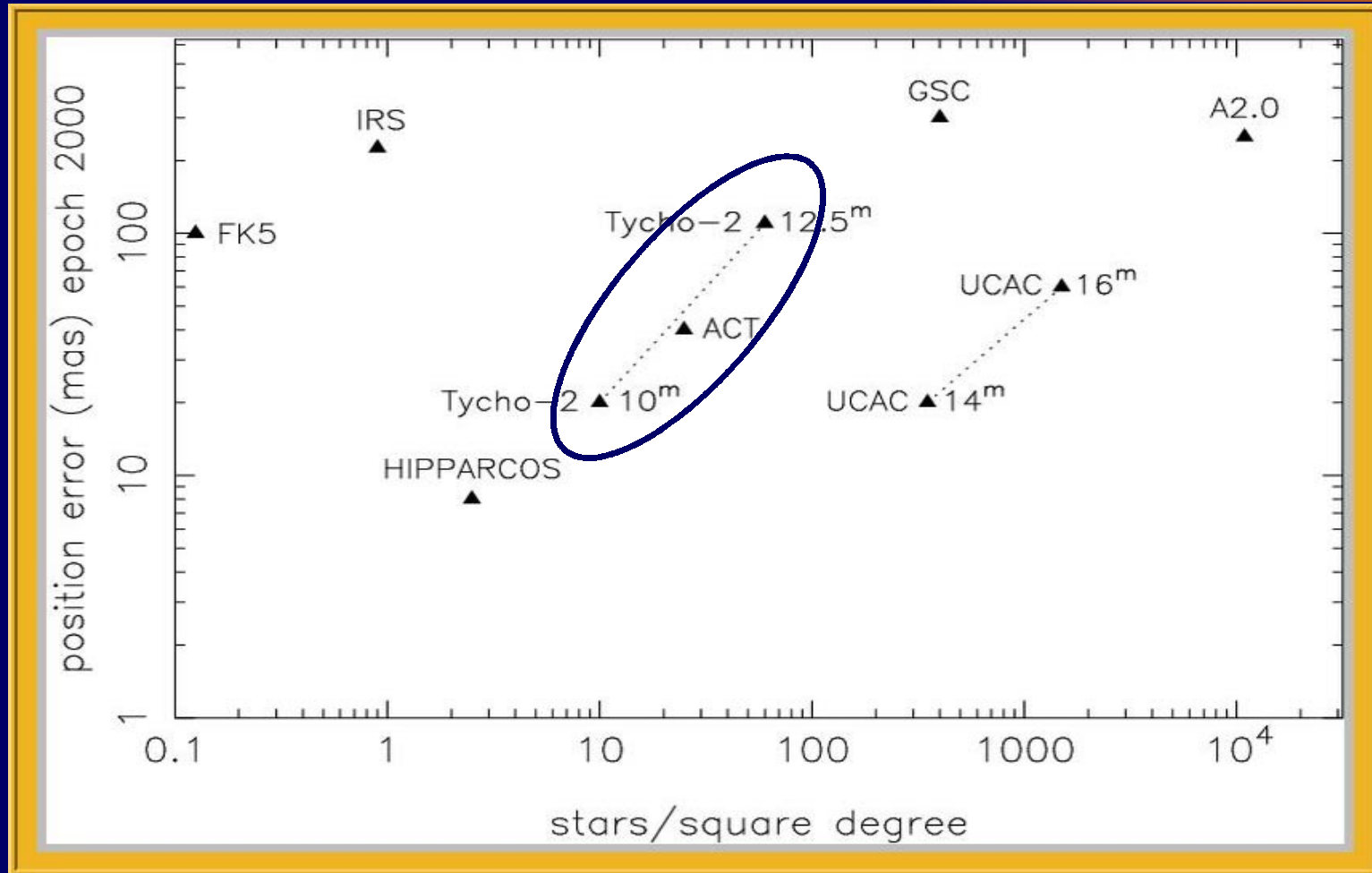


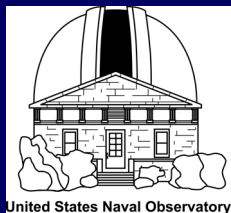
Major Astrometric Catalogs





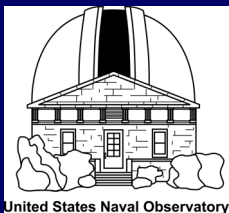
Major Astrometric Catalogs



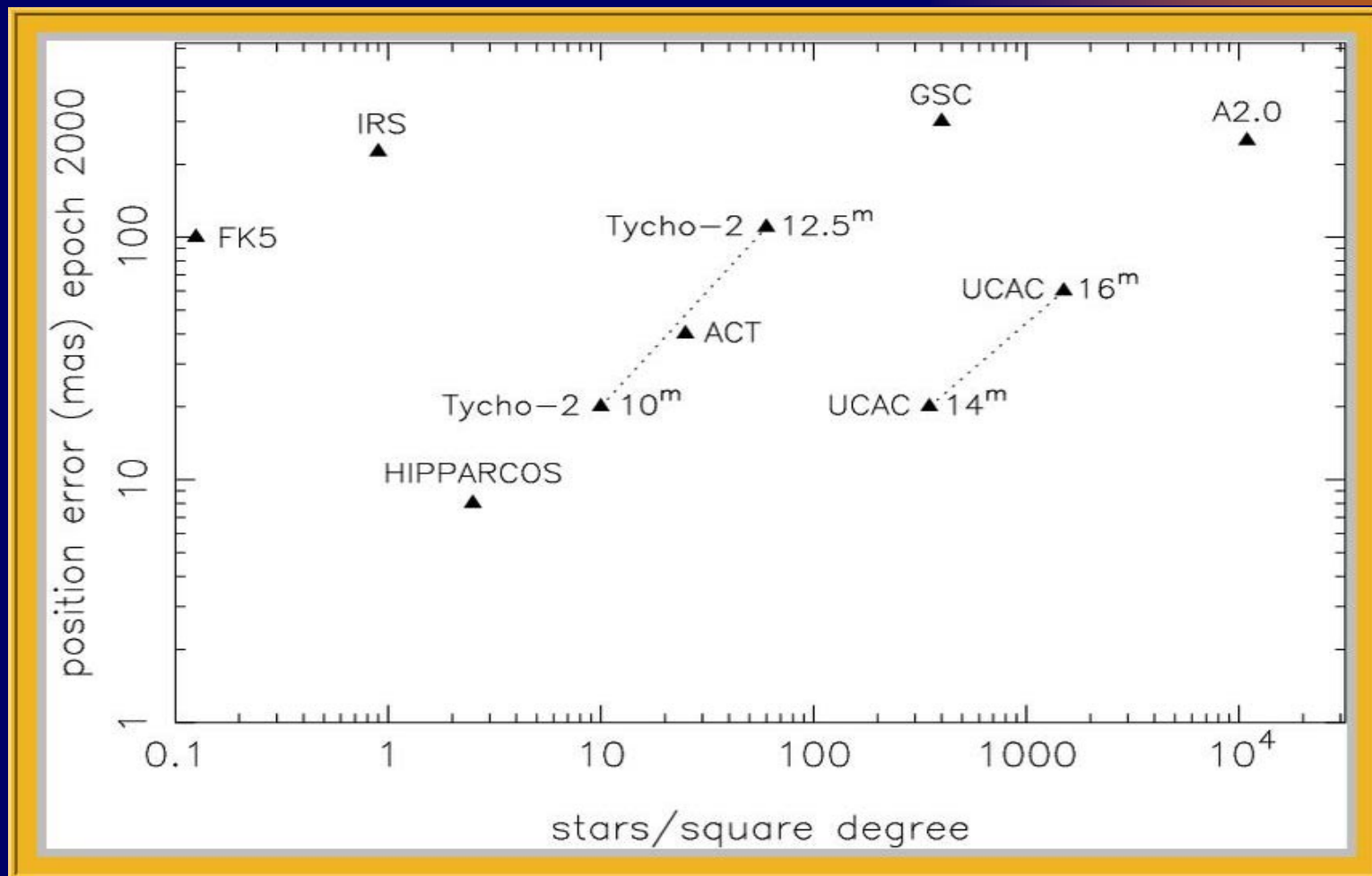


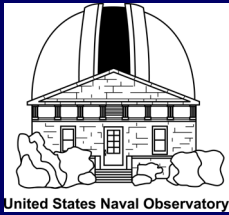
Tycho-2

- Number of stars: 2.54 million
- Mag. Range 0 to 12th
- Accuracies (2000)
 - Pos = 40 mas; P.M. = 1 to 3 mas/yr
- Tycho + TC + Astrographs + AC
- Not obsolete
- Disks available through me

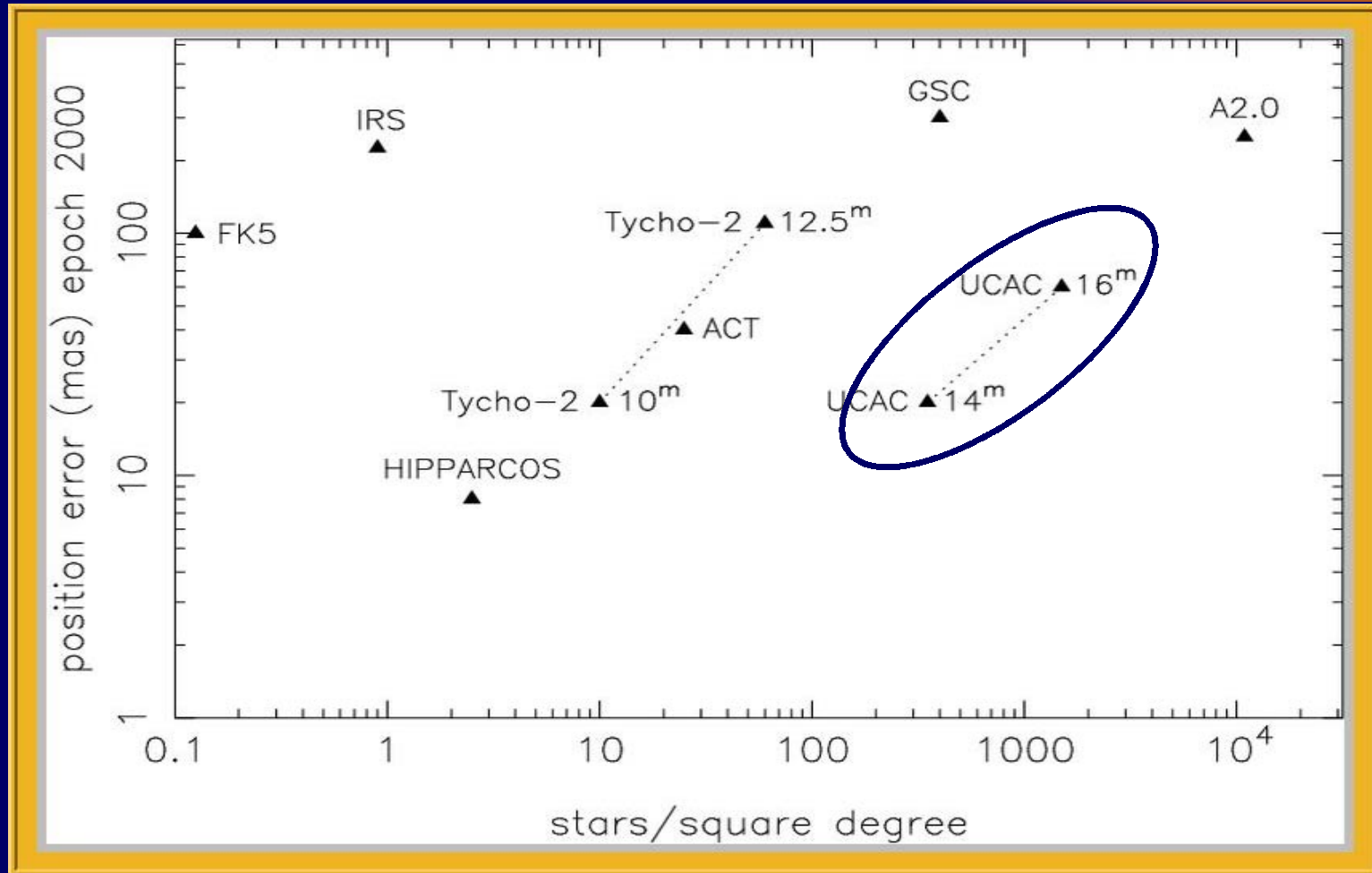


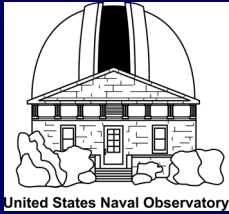
Major Astrometric Catalogs





Major Astrometric Catalogs



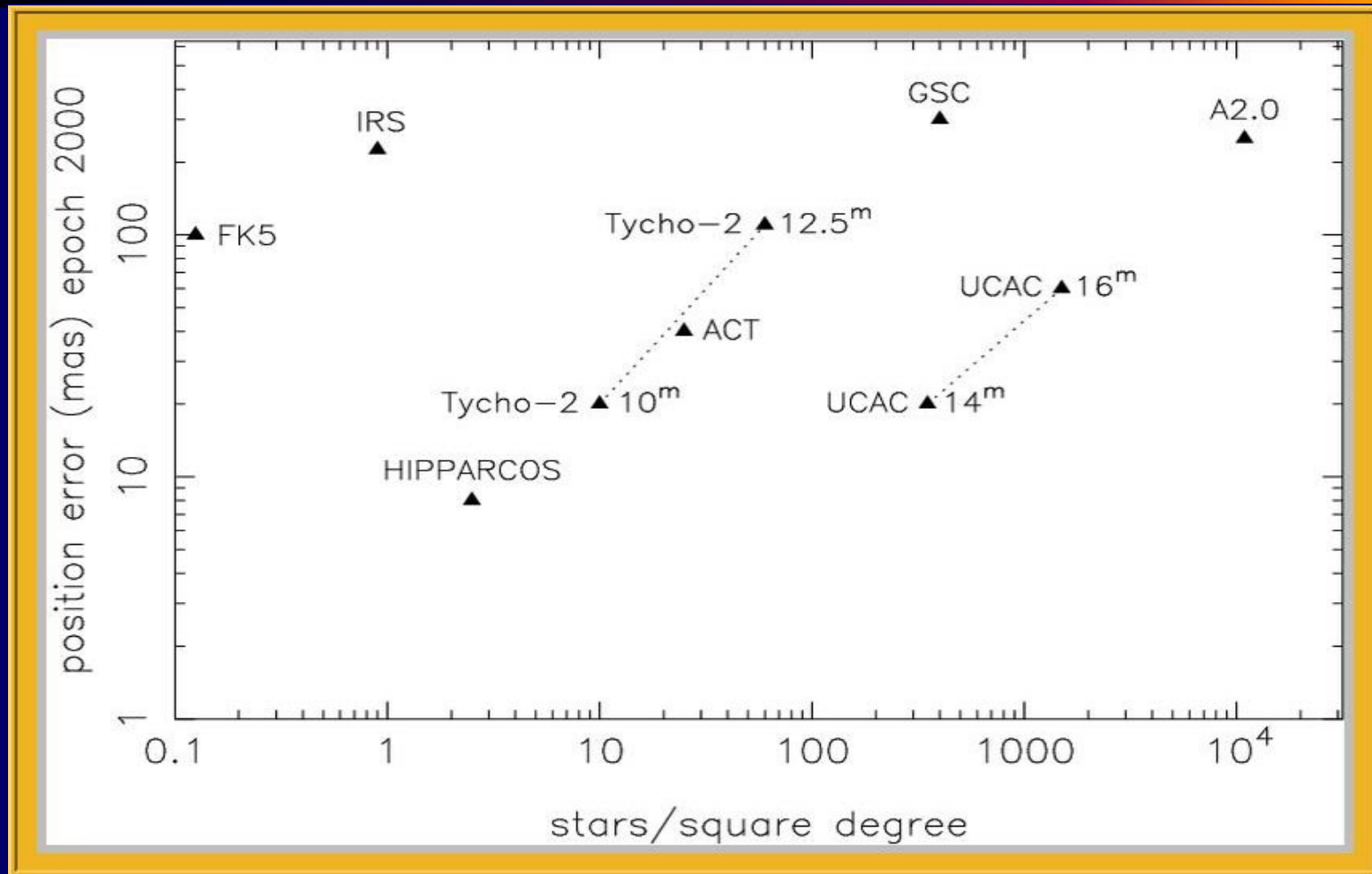


UCAC1

- Preliminary release March 2000
- Southern hemisphere coverage only
- Mag. Range 8th to 16th
- Accuracies (2000)
 - Pos. 20 to 70 mas; P.M. 2 to 12 mas/yr
- Observing continuing

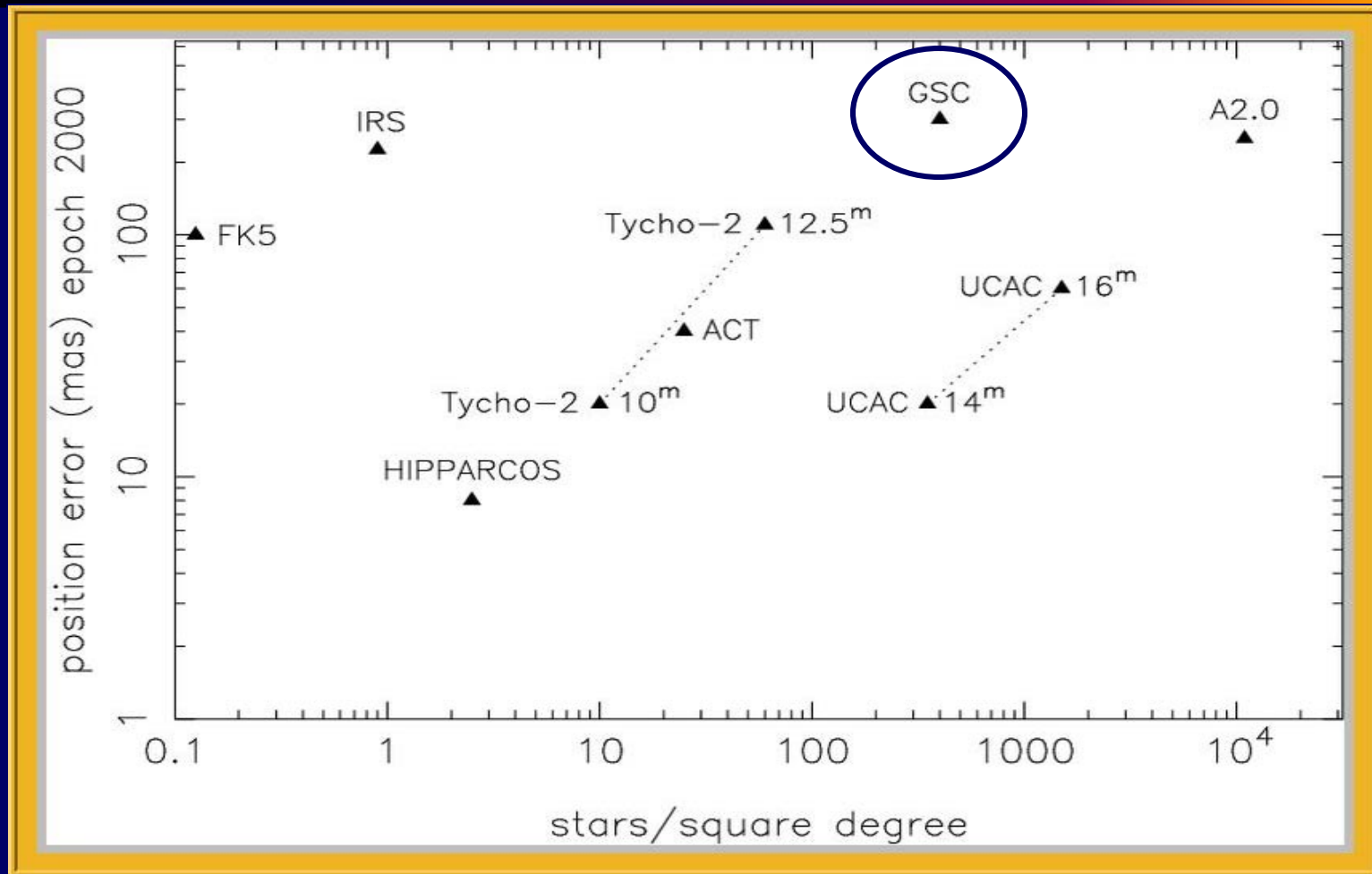


Major Astrometric Catalogs





Major Astrometric Catalogs



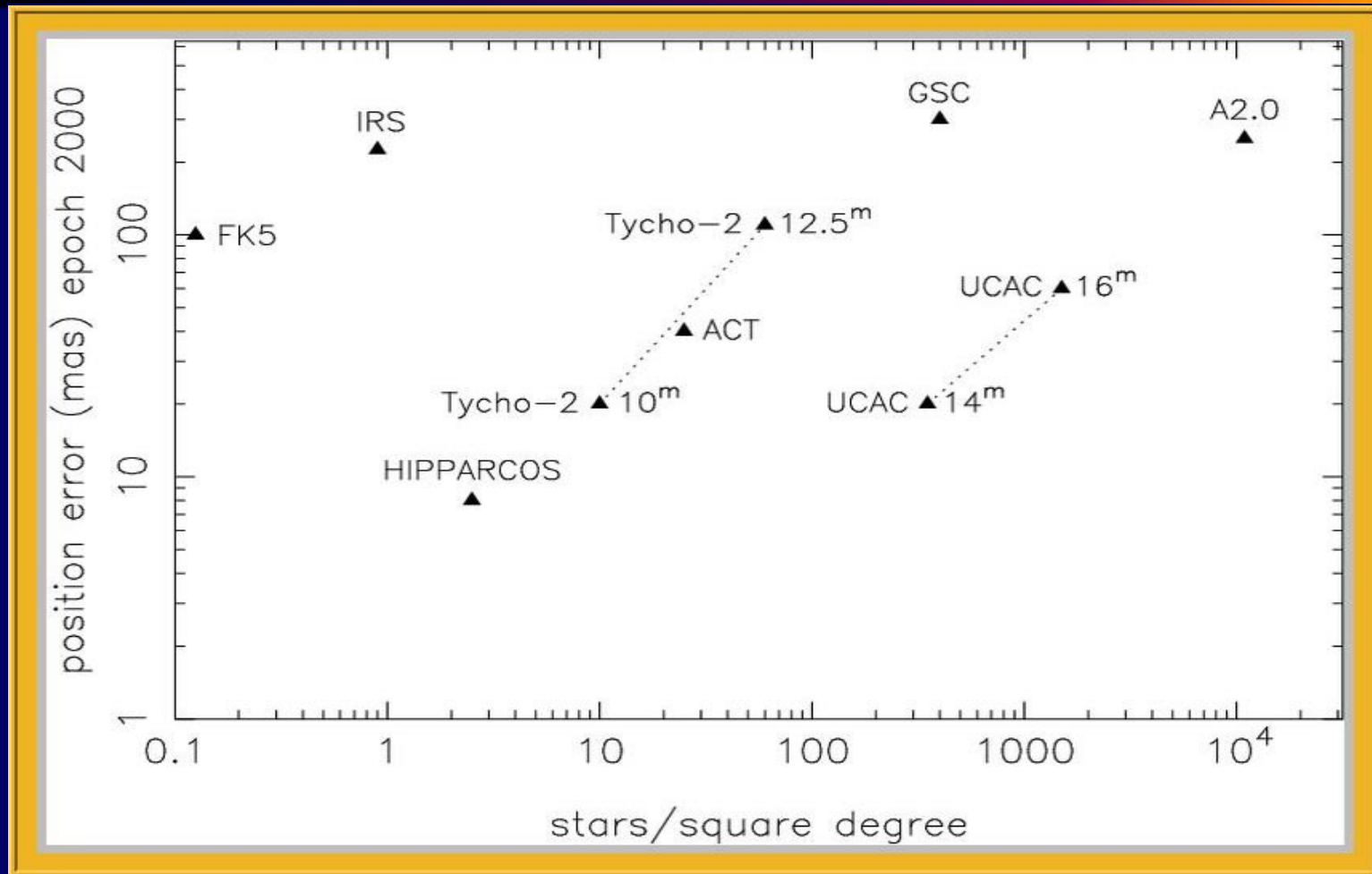


Guide Star Catalog 1.2

- Number of stars: 19 million
- Mag. Range 6 to 15th
- Accuracies 500 mas?
- Single epoch only, no proper motions
- Recommend using USNO A2.0

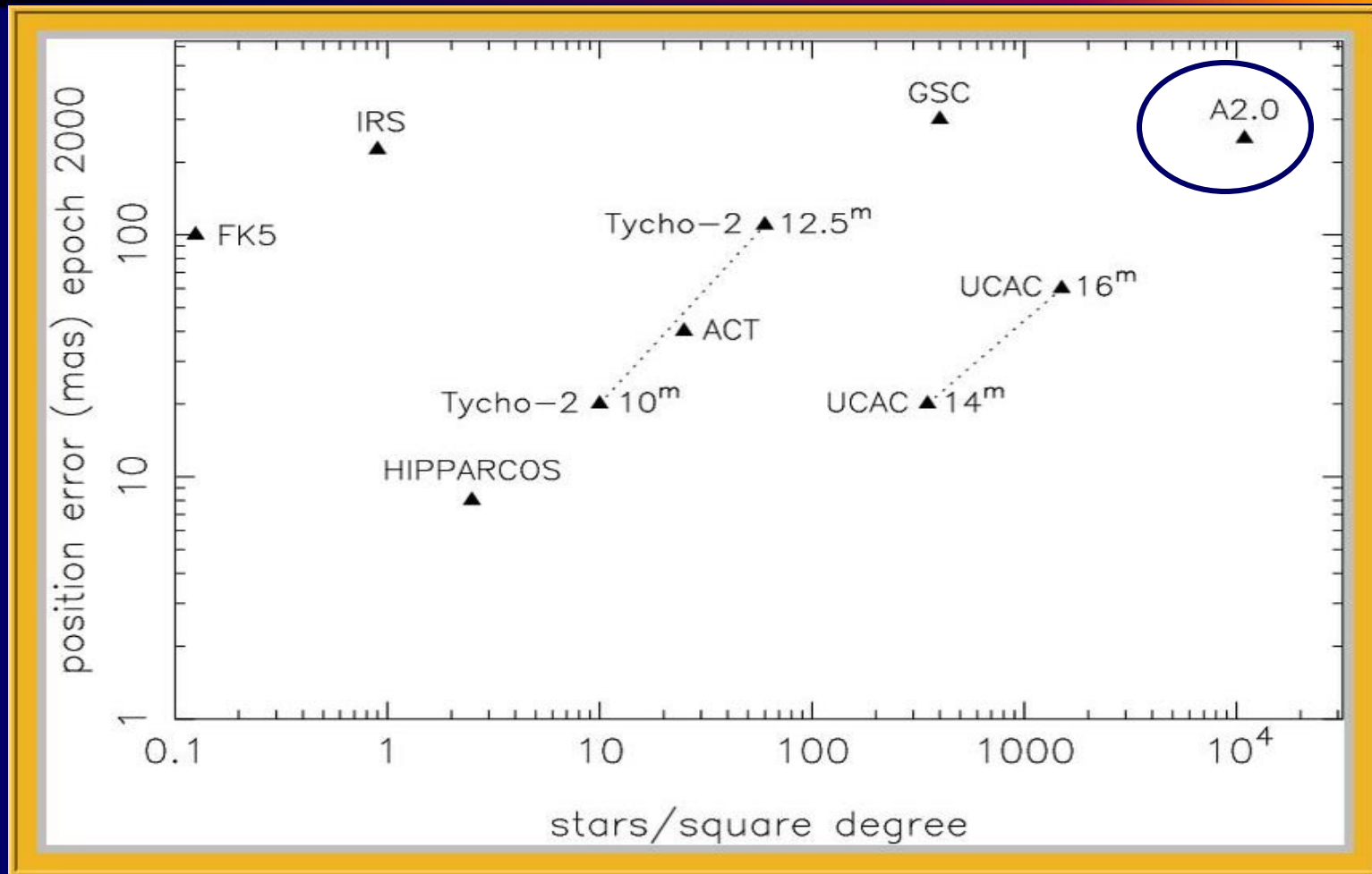


Major Astrometric Catalogs





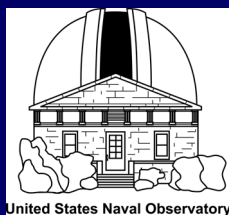
Major Astrometric Catalogs





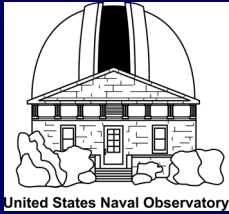
USNO A2.0

- Number of stars: 526 million
- Mag. range: 10 to 20?
- Accuracies 250 mas?
- Single epoch only, no proper motions
- To be replaced with B series (late 2002)



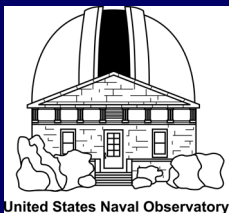
Catalog Summary

- Use Hipparcos, if possible
- Tycho-2 next
- UCAC1 can be used in south
- A2 if requiring very faint or very dense stars
- FK5, IRS, ACRS, PMM, ACT, and GSC are not recommended

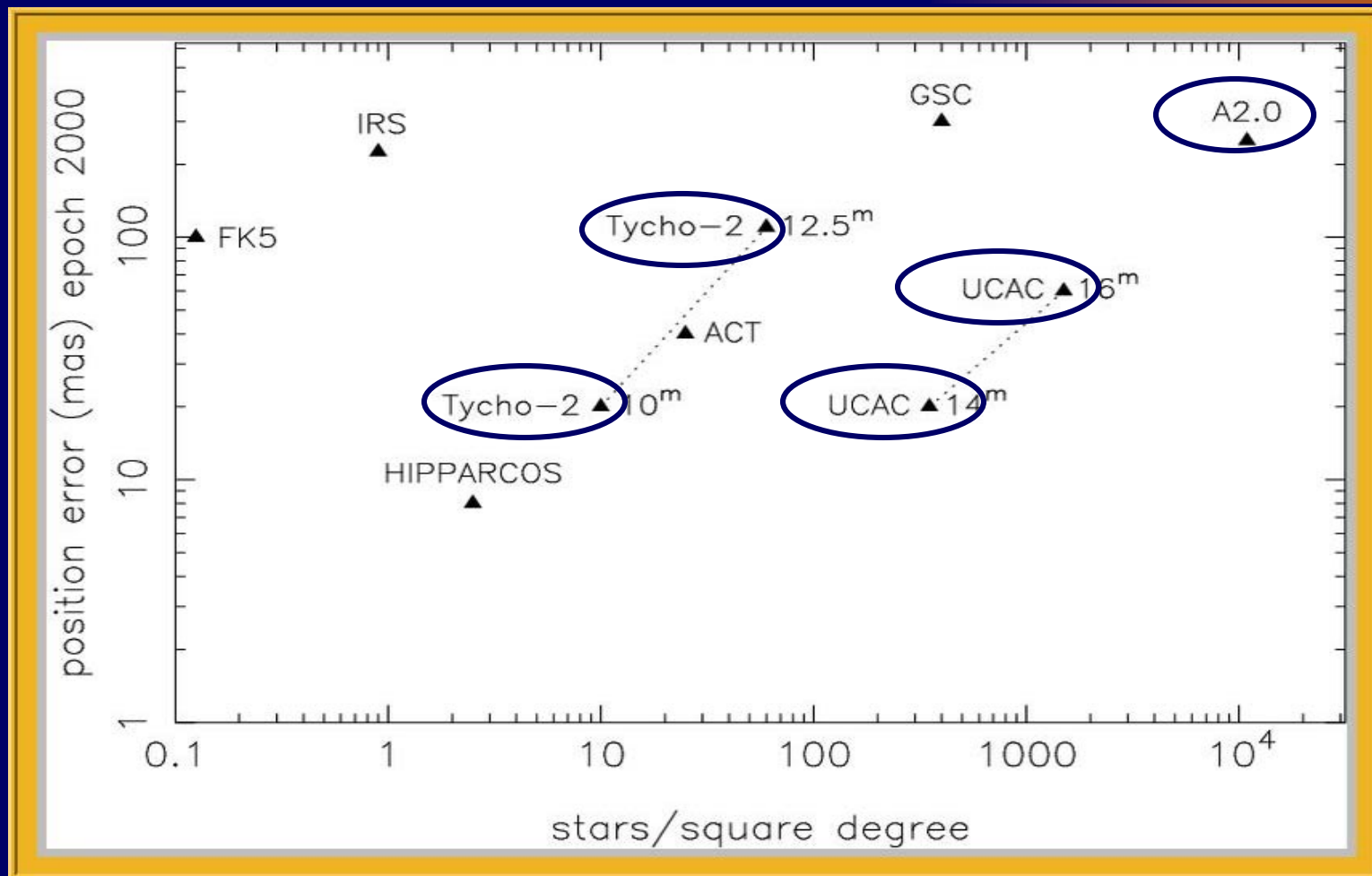


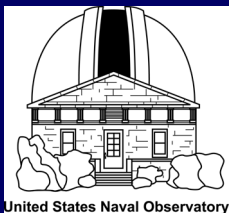
Final Thoughts

- Understand not all catalogs created equal
- Use the best sources of *a priori* data
- If possible, allow for updates



Recommended Catalogs





Recommended Catalogs

